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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/560,401	08/04/2006	Xhixin Jason Hou	00758.1509USWO	5535

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EXAMINER	
TRAN, BINH Q	
ART UNIT	PAPER NUMBER
3748	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/560,401	HOU ET AL.	
	Examiner	Art Unit	
	BINH Q. TRAN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-33 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-3 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 12/12/05;07/25/06.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Receipt and entry of Applicant's Preliminary Amendment dated December 12, 2005 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-16, and 20-33 are rejected under 35 U.S.C. 102 (e) as being anticipated by Lewis et al. (Lewis) (Patent Number 6,983,589).

Regarding claims 1, and 26, Lewis discloses a method for injecting fuel into a transient exhaust stream of an exhaust system (48), the method comprising: selecting a control volume

(e.g. 20) within the exhaust system; and using a model (12) derived from a transient energy balance equation for the control volume to determining the rate for fuel to be dispensed into the exhaust stream; and determining the mean temperature of the substrate; and using the mean temperature of the substrate as a parameter for controlling the introduction of the reactant into the exhaust stream (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 2, Lewis further discloses that wherein the control volume includes a catalytic converter (13, 14), wherein the catalytic converter is positioned upstream from a diesel particulate filter (15), wherein the fuel is dispensed upstream of the catalytic converter, and wherein rate for dispensing the fuel is selected to achieve a temperature at a downstream end of the catalytic converter that is suitable for causing regeneration of the diesel particulate filter without causing the diesel particulate filter to overheat (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 3, Lewis further discloses that wherein the exhaust system includes a catalytic converter positioned upstream from a diesel particulate filter and a fuel dispensing nozzle positioned upstream from the catalytic converter, and wherein the control volume starts upstream from the fuel dispensing nozzle and ends at the downstream end of the catalytic converter (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 4, Lewis further discloses the step of accessing pressure, temperature and mass flow data for the exhaust system, and using the data in concert with the model to determine the rate of fuel to be injected (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67) (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 5, Lewis further discloses that wherein the exhaust system includes a catalytic converter positioned upstream from a diesel particulate filter (15) and a fuel injector (16) positioned upstream from the catalytic converter, wherein temperature and pressure data are sensed upstream of the fuel injector and downstream of the catalytic converter, and wherein the temperature and pressure data are used in concert with the model to determine a fuel injection rate suitable to reach a temperature at the downstream end of the catalytic converter that is within a target temperature range (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 6, Lewis further discloses that wherein the model takes into consideration the vaporization efficiency of the fuel (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claims 7, Lewis further discloses that wherein the model takes into consideration the fuel conversion efficiency of the catalytic converter (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claims 8, Lewis further discloses that wherein the model takes into consideration the thermal energy storage rate of the catalytic converter (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claims 9, Lewis further discloses that wherein the model takes into consideration mass flow through the control volume (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claims 10, Lewis further discloses that wherein the transient energy balance equation is used to calculate a mean temperature of the catalytic converter, and wherein the mean temperature of the catalytic converter is used as a variable in the model.

Regarding claims 11, Lewis further discloses that wherein the fuel conversion efficiency of the catalytic converter is used as a variable in the model (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claims 12, Lewis further discloses that wherein the model uses the mean temperature of the catalytic converter as a parameter (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 13, Lewis discloses a method and apparatus for an exhaust system (48) comprising: an exhaust conduit (48); a reactant injector (16); a housing positioned outside the exhaust conduit for housing the reactant injector (16), the housing defining an air line port (Fig. 2) and a reactant line port (Fig. 2), the housing also defining a pre-mix region into which the reactant injector injects reactant; a reactant line coupled to the reactant line port of the housing for providing reactant to the reactant injector (16); an air line coupled to the air line port of the housing for providing compressed air to the pre-mix region, the reactant from the injector and the air from the air line being mixed at the pre-mix region to form a reactant/air mixture (16); a nozzle for spraying the reactant/air mixture into the exhaust conduit; and a mixed reactant/air conduit for conveying the reactant/air mixture from the pre-mix region of the housing to the nozzle (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claims 14, and 27-33, Lewis further discloses that wherein the control volume includes a catalytic converter (13, 14), wherein the catalytic converter is positioned upstream from a diesel particulate filter (15), wherein the fuel is dispensed upstream of the catalytic converter, and wherein rate for dispensing the fuel is selected to achieve a temperature at a downstream end of the catalytic converter that is suitable for causing regeneration of the diesel

particulate filter without causing the diesel particulate filter to overheat (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claims 15, and 16, Lewis further discloses that wherein the nozzle is positioned upstream from a NOx catalyst (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 20, Lewis further discloses a pump (51) for supplying pressurized reactant to the reactant line (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 21, Lewis further discloses an air tank in fluid communication with the air line (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 22, Lewis further discloses an air pressure regulator in fluid communication with the air line for regulating the pressure of the air within the air line (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 23, Lewis further discloses a solenoid valve in fluid communication with the air line for controlling the flow of air within the air line (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 24, Lewis further discloses that wherein the reactant comprises fuel, and the reactant injector comprises a fuel injector (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 25, Lewis further discloses that wherein the housing includes a first block and a second block between which the reactant injector is mounted (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 27, Lewis further discloses that wherein the substrate is catalyzed to promote a reaction of the reactant at the substrate (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 28, Lewis further discloses that wherein the reactant includes a hydrocarbon fuel, and wherein the hydrocarbon fuel is injected into the exhaust stream at a location upstream from the substrate (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 29, Lewis further discloses that wherein the substrate comprises a diesel oxidation catalyst (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 30, Lewis further discloses that wherein the substrate comprises a lean NOx catalyst (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 31, Lewis further discloses that wherein the substrate comprises a NOx trap (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 32, Lewis further discloses that wherein a mathematical model is used to control the injection of reactant into the exhaust stream, the model including the mean temperature of the substrate as a variable (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Regarding claim 33, Lewis further discloses that wherein the reactant is injected into the exhaust stream at a location upstream from the substrate (e.g. See col. 3, lines 40-67; col. 4, lines 1-67; col. 5, lines 1-18).

Claims 1, 4, 13, 15-16, and 25-33 are rejected under 35 U.S.C. 102 (b) as being anticipated by Patchett et al. (Patchett) (Patent Number 6,415,602).

Regarding claims 1, and 26, Patchett discloses a method for injecting fuel into a transient exhaust stream of an exhaust system (39), the method comprising: selecting a control volume (99) within the exhaust system; and using a model (Fig. 4) derived from a transient energy balance equation for the control volume to determining the rate for fuel to be dispensed into the exhaust stream; and determining the mean temperature of the substrate; and using the mean temperature of the substrate as a parameter for controlling the introduction of the reactant into the exhaust stream (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 4, Patchett further discloses the step of accessing pressure, temperature and mass flow data for the exhaust system, and using the data in concert with the model to determine the rate of fuel to be injected (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 13, Patchett discloses a method and apparatus for an exhaust system (39) comprising: an exhaust conduit (39); a reactant injector (56); a housing positioned outside the exhaust conduit for housing the reactant injector (54), the housing defining an air line port (55) and a reactant line port (54), the housing also defining a pre-mix region into which the reactant injector injects reactant; a reactant line coupled to the reactant line port of the housing for providing reactant to the reactant injector (56); an air line coupled to the air line port of the housing for providing compressed air to the pre-mix region, the reactant from the injector and the air from the air line being mixed at the pre-mix region to form a reactant/air mixture (54); a nozzle for spraying the reactant/air mixture into the exhaust conduit; and a mixed reactant/air

conduit for conveying the reactant/air mixture from the pre-mix region of the housing to the nozzle (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claims 15, and 16, Patchett further discloses that wherein the nozzle is positioned upstream from a NOx catalyst (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 20, Patchett further discloses a pump (51) for supplying pressurized reactant to the reactant line (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 21, Patchett further discloses an air tank in fluid communication with the air line (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 22, Patchett further discloses an air pressure regulator in fluid communication with the air line for regulating the pressure of the air within the air line (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 23, Patchett further discloses a solenoid valve in fluid communication with the air line for controlling the flow of air within the air line (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 24, Patchett further discloses that wherein the reactant comprises fuel, and the reactant injector comprises a fuel injector (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 25, Patchett further discloses that wherein the housing includes a first block and a second block between which the reactant injector is mounted (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 27, Patchett further discloses that wherein the substrate is catalyzed to promote a reaction of the reactant at the substrate (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 28, Patchett further discloses that wherein the reactant includes a hydrocarbon fuel, and wherein the hydrocarbon fuel is injected into the exhaust stream at a location upstream from the substrate (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 29, Patchett further discloses that wherein the substrate comprises a diesel oxidation catalyst (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 30, Patchett further discloses that wherein the substrate comprises a lean NOx catalyst (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 31, Patchett further discloses that wherein the substrate comprises a NOx trap (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 32, Patchett further discloses that wherein a mathematical model is used to control the injection of reactant into the exhaust stream, the model including the mean temperature of the substrate as a variable (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Regarding claim 33, Patchett further discloses that wherein the reactant is injected into the exhaust stream at a location upstream from the substrate (e.g. See col. 19, lines 14-67; cols. 20-24, lines 1-67).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over both Lewis and Patchett in view of design choice.

Regarding claims 17-19, both Lewis and Patchett discloses all the claimed limitation as discussed above except the pressure of the reactant supplied to the reactant injector is 10 to 100 pounds per square inch.

Regarding the specific range of the pressure of the reactant supplied to the reactant injector, it is the examiner's position that a range between 10 to 100 pounds per square inch of the pressure of the reactant supplied to the reactant injector, would have been an obvious matter of design choice well within the level of ordinary skill in the art, depending on variables such as mass and volume flow rate of the exhaust gas, as well as size of the engine, properties of materials for making the NOx storage catalyst, and the controlled temperature of the catalytic converter. Moreover, there is nothing in the record, which establishes that the claimed parameters present a novel or unexpected result (See In re Kuhle, 562 F. 2d 553, 188 USPQ 7 (CCPA 1975)).

Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. In re Dreyfus, 22 CCPA (Patents) 830, 73 F.2d 931, 24 USPQ 52; In re Waite et al., 35 CCPA (Patents) 1117, 168 F.2d 104, 77 USPQ 586. Such ranges are termed "critical" ranges, and the applicant has the burden of proving such criticality. In re Swenson et al., 30 CCPA (Patents) 809, 132 F.2d 1020, 56 USPQ 372; In re Scherl,

33 CCPA (Patents) 1193, 156 F.2d 72, 70 USPQ 204. However, even though applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art. In re Sola, 22 CCPA (Patents) 1313, 77 F.2d 627, 25 USPQ 433; In re Normann et al., 32 CCPA (Patents) 1248, 150 F.2d 627, 66 USPQ 308; In re Irmscher, 32 CCPA (Patents) 1259, 150 F.2d 705, 66 USPQ 314. More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; Minnesota Mining and Mfg. Co. v. Coe, 69 App. D.C. 217, 99 F.2d 986, 38 USPQ 213; Allen et al. v. Coe, 77 App. D.C. 324, 135 F.2d 11, 57 USPQ 136.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of five patents:

Kinugawa et al. (Pat. No. 7048891), Yasui et al. (Pat. No. 7047728), Schmelz et al. (Pat. No. 5628186), Emmerling et al. (Pat. No. 6119448), and Van Nieuwstadt et al. (Pat. No. 6990800) all discloses an exhaust gas purification for use with an internal combustion engine.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Binh Tran whose telephone number is (571) 272-4865. The examiner can normally be reached on Monday-Friday from 8:00 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reach on (571) 272-4859. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BT
February 17, 2007

Binh Q. Tran
Patent Examiner
Art Unit 3748